

Makoto MATSUSHIMA, S.N. 10/695,839
Page 6

Dkt. 2271/71352

REMARKS

The application has been reviewed in light of the Office Action dated January 17, 2007. Claims 1-11 were pending. By this Amendment, claims 2 and 9 have been amended to clarify the claimed subject matter thereof, and new dependent claim 12 has been amended. Accordingly, claims 1-11 are presented for reconsideration, with claims 1, 5 and 8 being in independent form.

Claims 2 and 9 were rejected under 35 U.S.C. §112, second paragraph, as allegedly indefinite.

By this Amendment, claims 2 and 9 have been amended to clarify the claimed subject matter thereof.

Withdrawal of the rejection under 35 U.S.C. §112, second paragraph, is respectfully requested.

Claims 1-2, 5, 6 and 8-10 were rejected under 35 U.S.C. § 102(a) as purportedly anticipated by U.S. Patent No. 6,658,583 to Kudo et al.

Applicant has carefully considered the Examiner's comments and the cited art, and respectfully submits that independent claims 1, 5 and 8 are patentable over the cited art, for at least the following reasons.

This application relates to pulse width modulation (PWM) signal generating circuits. Applicant devised an improved pulse width modulation signal generating circuit which outputs a stable PWM signal wherein a duty ratio is increased and decreased at a predetermined rate within a predetermined period. Each of independent claims 1, 5 and 8 addresses these features, as well as additional features.

Makoto MATSUSHIMA, S.N. 10/695,839
Page 7

Dkt. 2271/71352

Kudo, as understood by Applicant, proposes a PWM control circuit comprising a counter for incrementing or decrementing a count value in accordance with a given operation clock, an edge-point value setting register for storing an edge-point value which specifies an edge-point at which the signal level of a PWM signal varies, a PWM output circuit for varying the signal level of the PWM signal at the edge-point specified by the edge-point value, based on the count value from the counter and the edge-point value from the edge-point value setting register, and a delay value setting register for storing a delay value which specifies a delay time of the first edge-point, wherein the PWM output circuit delays the first edge-point by a period which is smaller than one-clock period of the operation clock, in accordance with the delay value stored in the delay value setting register.

Kudo, column 1, lines 15-46, which was cited in the Office Action, states as follows:

A conventional PWM control circuit as shown in FIG. 1B comprises a PWM period value setting register 900, a counter 902, an edge-point value setting register 904, comparators 906, 908 and an RS flip-flop 909, for example.

The PWM period value setting register 900 is one that stores a period value for specifying the period TP of a PWM signal Shown in FIG. 1C. The counter (increment counter) 902 increments a count value based on an operation clock CLK. The edge-point register 904 stores an edge-point setting for specifying a first edge-point (or rising edge) 910 of FIG. 1C at which the level of the PWM signal may change from L-level to H-level, for example.

The comparator 906 compares the edge-point value from the edge-point value setting register 904 with the count value from the counter 902. If they are identical with each other, the comparator 906 generates a H-level signal to be outputted toward the terminal S (set terminal) of the RS flip-flop 909. Thus, the PWM signal will vary from L-level to H-level as shown by the first edge-point (or rising edge) 910 in FIG. 1C.

The comparator 908 compares the period value from the PWM period value setting register 900 with the count value from the counter 902. If they are identical with each other, the comparator 908 generates a H-level signal to be outputted toward the terminal R (reset terminal) of the RS flip-flop 909. Thus, the PWM signal will vary from R-level to L-level as shown by the second edge-point (or falling edge) 912 in FIG. 1C.

Makoto MATSUSHIMA, S.N. 10/695,839
Page 8

Dkt. 2271/71352

However, it was found that such a PWM control circuit of the prior art raised the following problems when it was included in a microcomputer or ASIC.

Thus, according to Kudo, Fig. 1B shows a conventional PWN control circuit, and the PWM signal generated according to the circuit by the conventional PWN control circuit shown in Fig. 1B is shown in Fig. 1C.

As is evident in Fig. 1C, and from the discussion in Kudo, column 1, lines 15-46, the time period between (i) the time when the PWM signal is changed into the active state and (ii) the time when the PWM signal is changed into the inactive state, in the PWM signal generated by the conventional PWN control circuit of Kudo does not increase or decrease.

Applicant submits that Kudo simply does not teach or suggest a PWM signal generating circuit comprising a first counter circuit periodically changing a PWM signal output therefrom into an active state, and a second counter circuit changing the PWM signal, which has been changed into the active state by the first counter circuit, into an inactive state within each cycle, wherein the second counter circuit increases and decreases a time period between (i) a time when the PWM signal is changed into the active state and (ii) a time when the PWM signal is changed from the active state to the inactive state, as provided by the subject matter of claim 1.

Independent claims 5 and 8 are patentably distinct from the cited art for at least similar reasons.

Accordingly, for at least the above-stated reasons, Applicant respectfully submits that independent claims 1, 5 and 8, and the claims depending therefrom, are patentable over the cited art.

Makoto MATSUSHIMA, S.N. 10/695,839
Page 9

Dkt. 2271/71352

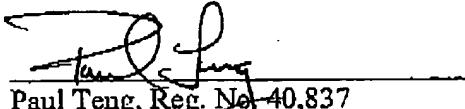
The Office Action indicates that claims 4, 7 and 11 are objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. However, since independent claims 1, 5 and 8 are submitted to be patentable over the cited art, no changes to the form of claims 4, 7 and 11 are believed to be necessary.

In view of the remarks hereinabove, Applicant submits that the application is now in condition for allowance. Accordingly, Applicant earnestly solicits the allowance of the application.

If a petition for an extension of time is required to make this response timely, this paper should be considered to be such a petition. The Patent Office is hereby authorized to charge any fees that are required in connection with this amendment and to credit any overpayment to our Deposit Account No. 03-3125.

If a telephone interview could advance the prosecution of this application, the Examiner is respectfully requested to call the undersigned attorney.

Respectfully submitted,



Paul Teng, Reg. No. 40,837
Attorney for Applicant
Cooper & Dunham LLP
Tel.: (212) 278-0400